International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

COMPUTER-ASSISTED ALL, AML, CLL, CML DETECTION AND COUNTING FOR DIAGNOSIS OF BLOOD CANCER

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Abstract -*Leukemia could be a cancer of white blood cells (WBCs) which damages blood and bone marrow of shape. It can be fatal illness if not diagnose at earlier stage. Typically complete blood count (CBC) or morphological image analysis is employed to manually diagnose the malignant neoplastic disease cells. These ways are time consuming and fewer correct that must be mounted. In this paper we've got planned an automatic technique for the detection of acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), Chronic lymphocytic leukemia (CLL), Chronic myeloid leukemia (CML) by microscopic blood image analysis. This approach initial section out the various kinds of cells from the image i-e. White blood cells, red blood cells and platelets. Afterward Lymphocytes are separated from the white blood cells. Then form and color options are extracted from these lymphocytes that are given to SVM classifier to classify the cells into traditional and blast. After that the counting of the WBC cells are also detected for accurate diagnosis. This automated malignant neoplastic disease detection system found to be more practical, fast and correct as compare to manual identification ways.*

1. INTRODUCTION

The term digital image refers to processing of a two dimensional picture by a computer . An image given within the sort of a transparency, slide, photograph or an X-ray is first digitized and stored as a matrix of binary digits in memory . This digitized image can then be processed and/or displayed on a high-resolution tv monitor .

1.1 What is image processing?

As detailed within the diagram, the primary step within the process is images acquisition by an imaging sensors in conjunction with a digitizer to the image. subsequent step is that the preprocessing images is improved fed as an input to the opposite processes. Preprocessing typically with removing noise, isolating regions, etc. Segmentation partitions an images into its or objects. The output of segmentation is typically raw pixel data, which of the or the pixels within the region themselves. Representation is that the process of remodeling the raw pixel data into a form useful processing the computers. Description deals with extracting that are basic in differentiating one class of objects from another. Recognition assigns a to an object supported the knowledge provided by its descriptors. Interpretation involves to an of recognized objects. The knowledge a few problem domain is into the bottom . The knowledge domain guides the operation of every processing module and also controls the modules. Not all modules need be necessarily present for a selected function. The composition of image processing system depends on its application. The frame rate of the processor is around 25 frames per second

2. MODULES DESCRIPTION

2.1 INPUT IMAGE

Read and Display an input Image. Read a picture into the workspace, using the imread command. In image processing, it's defined because the action of retrieving a picture from some source, usually a hardware-based source for processing. It is the primary step within the workflow sequence because, without a picture , no processing is feasible . The image that is acquired is completely unprocessed.

2.2 PREPROCESSING

Pre-processing may be a common name for operations with images at rock bottom level of abstraction both input and output are intensity images. Neighboring pixels like one object in real images have essentially an equivalent or similar brightness value. Thus distorted pixel can often be restored as a mean value of neighboring pixels.

2.2.1 RESIZING THE IMAGE

All the input images are resized into same dimensions. If the required size doesn't produce an equivalent ratio because the input image, the output image are going to be distorted.

2.2.2 CONVERTING COLOUR FORMAT

If you get into the business of attempting to distinguish colors from one another, then one reason for converting RGB image to BLACK AND WHITE or GRAYSCALE or RGB image to HSV formats in image.

2.3 SEGMENTATION

Image segmentation may be a commonly used technique in digital image processing and analysis to partition a picture into multiple parts or regions, often supported the

characteristics of the pixels in the image. Segmentation may be a process of grouping together pixels that have similar attributes. Image Segmentation is that the process of partitioning a picture into non-intersecting regions such each region is homogeneous and therefore the union of no two adjacent regions is homogeneous Pixels in a region are similar consistent with some homogeneity criteria like color, intensity or texture so on locate and identify objects and limits (lines,curves,etc) in a picture . Segmentation accuracy determines the eventual success or failure of computerized analysis procedure.

2.3.1 COLOUR SPACE CONVERSIONS

Color space conversion is that the translation of the representation of a color from one basis to a different . This typically occurs within the context of converting a picture that's represented in one color space to a different color space, the goal being to form the translated image look as similar as possible to the original. Here we use rgb to ycbcr color space conversion for white blood cell segmentation.

2.3.2 MORPHOLOGICAL OPERATIONS

Morphological image processing may be a collection of non-linear operations associated with the form or morphology of features in a picture . Morphology may be a broad set of image processing operations that process images supported shapes. Morphological operations apply a structuring element to an input image, creating an output image of an equivalent size.

2.4 FEATURE EXTRACTION

Feature extraction is related to dimensionality reduction. When the input file to an algorithm is just too large to be processed and it's suspected to be redundant Determining a subset of the initial features is named feature selection. The selected features are expected to contain the relevant information from the input file , in order that the specified task are often performed by using this reduced representation rather than the complete initial data.

2.4.1 SHAPE FEATURES

Visual features of objects are called the shape characteristics or visual features. For example, circular object or triangular objects or other shapes, perimeter boundary of the object, the diameter of the border and so on. The visual features showed intuitively are all belongs to shape features.

2.4.2 COLOUR FEATURES

Global features include color and texture histograms and color layout of the entire image. Local features include color, texture, and shape features for sub images, segmented regions, and interest points.

2.4.3 GEOMETRICAL FEATURES

Geometric features are features of objects constructed by a group of geometric elements like points, lines, curves or surfaces. These features are often corner features, edge features, Blobs, Ridges, salient point's image texture then on, which may be detected by feature detection methods. Here we use area, diameter, density features for calculations.

2.4.4 TEXTURE FEATURES

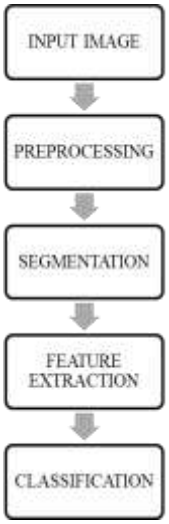
Image Texture gives us information about the spatial arrangement of color or intensities in a picture or selected region of a picture . Here we use GLCM (Grey Level Co-occurrences Matrix) for texture feature analysis.

2.5 CLASSIFICATION

The resulting raster from image classification are often wont to create thematic maps. The recommended thanks to perform classification and statistical method is thru the Image Classification toolbar. There are many classification algorithms are available and some classification algorithm that are given below,

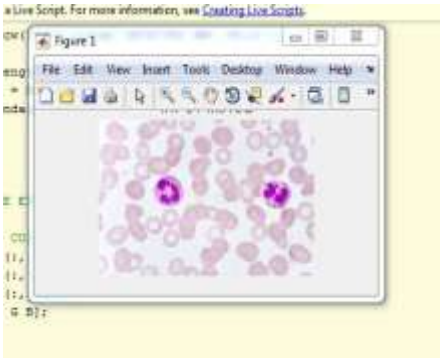
3. SYSTEM TECHNIQUES

SYSTEM ARCHITECTURE

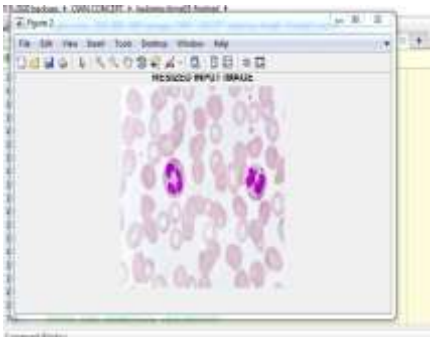


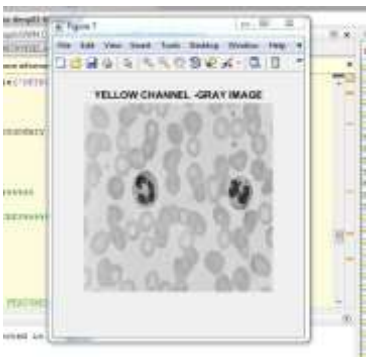
SNAPSHOT

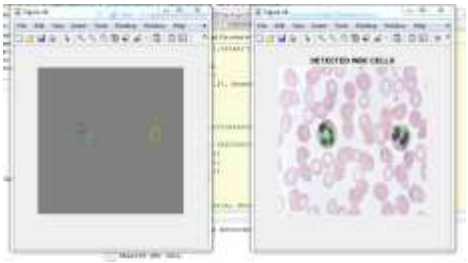
INPUT IMAGE

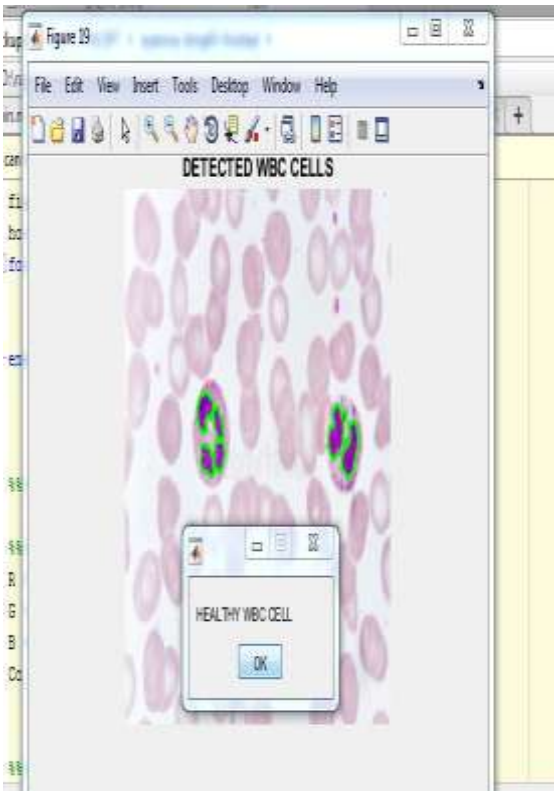


RESIZE IMAGE









CONCLUSION

In this paper, efforts have been made for the detection and counting of acute lymphoblastic leukemia from microscopic blood images by using image processing techniques. Preprocessing was applied over the images to remove any noise, and then segmentation is performed to detect lymphocytes from the image. Watershed is used to separate the grouped lymphocytes after extracting shape and color features; SVM is used to classify normal and blast cells. In future, we can further improve this system to detect different types of leukemia and other blood related diseases

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